

CSI SPECIFICATION: *MPCQ Platinum*

SECTION: 230913 Instrumentation and Control devices for HVAC

PART 1 GENERAL

1.1 Summary

A. Section Includes:

1. Multi-stage steam boiler cycling and set point sequencing control.

B. Related Sections:

1. Conforms to applicable building code requirements of all authorities having jurisdiction.

1.2 References

A. International Organization for Standardization (ISO)

1. Manufacturer shall be ISO 9001:2000 Quality Management Systems Certified.

B. National Electrical Manufacturers Association (NEMA)

1. Enclosure follows standard NEMA Standard 250. (NEMA-1)

C. Underwriters Laboratories, Inc. (UL):

1. The control shall be tested per standard 916 "Energy Management Equipment".

D. The City of New York, Department of Environmental Protection (DEP).

1. The control shall be approved for installation in New York City by DEP under "Engineering Criteria for Fuel Oil Burning Equipment".

1.3 Quality Assurance

A. Manufacturer's Quality System:

1. Registered to ISO 9001:2000 Quality Standard, including in-house engineering for product design activities.
2. The control must be UL tested and certified per standard 916 "Energy Management Equipment".

1.4 Control Operation

A. Description: The control shall operate on 120 VAC, with a maximum power of 30 VA. The control shall be pre-engineered and programmed exclusively for the cycling, sequencing, and lead rotation of multiple steam boilers based on a PID logic. It shall be capable of sequencing stages for outdoor reset steam cycling or to achieve and maintain a specific pressure set point.

B. Stages: The control shall have eight normally open relay contacts that can be used to start and stop each stage. The control shall have the capability to operate multiple single-stage, two-stage, three-stage, or four-stage units. It shall be capable of controlling eight stages. It shall be capable of controlling up to 24 total stages using a maximum of two external compatible extension controls.

C. Sequence of Operation:

1. **Steam Cycling:** If the outdoor temperature is below the outdoor cutoff temperature setting, the control PID shall check if the system pressure is below the system heat-establishing pressure. If space sensors are used, the control shall check if the space average is below the space target. If it is, the control shall energize the lead stage and then sequence the rest of the available stages to reach the establishing heat set point. When the system pressure reaches the system set point, the control shall start the heating Cycle-On period based on the outdoor temperature and the heat adjustment setting. After the Cycle-On period expires, the control shall sequence the stages off for the Cycle-Off period.
2. **Adding and Subtracting Stages:** After the purge elapses and during the establishing heat and Cycle-On periods, the control shall use a number of adjustable settings to customize the sequencing to the specific application and equipment being controlled. These settings shall include reaction time, minimum runtime, last stage hold, and standby delay. If additional output is required, the control shall wait a full reaction time before energizing any additional stages. If the control PID requires output reduction, the control shall turn-off a stage after making sure that the stage has run for a full minimum runtime before de-energizing it.

D. Features:

1. **Steam Cycle:** The Control shall be capable of cycling the steam heating system based on the outdoor temperature. The cycle shall consist of a Cycle-On and a Cycle-Off periods that vary in length based on the outdoor temperature.
2. **Heat Adjustment:** The control shall provide two (2) independent heat adjustments, one for Normal (Day) mode and one for Save (Night) mode. The heat adjustment shall allow for the selection of various "cycling" curves that regulate the heating system in accordance with the outside temperature.
3. **Manual Shift:** A menu selection option shall be provided to immediately switch from the Normal (Day) to Save (Night), Save to Normal mode, or Save to Extended Day with an adjustable delay. If a shift to Save (Night) or to Normal (Day) is selected the control shall remain as such until the next setting on the schedule. In Extended Day mode, a shift to Normal (Day) the control shall automatically revert back to the Save (Night) mode after an adjustable time delay that ranges from 60 to 240 minutes.
4. **Boost (Optimum Start/Stop):** The control shall incorporate 3 separate field selectable "boost" functions. During the "boost" period the steam source will not be cycled. The digital display will indicate a boost is occurring and the type of boost. The choices shall be:
 - a. **Manual boost** shall offer a fixed warm-up period of 0-120 minutes.
 - b. **Vari-Boost** shall offer an automatic variable warm-up period that varies in length based on the outside temperature.
 - c. **Vari-Boost with Early Shutdown** shall provide an automatically variable warm-up with an automatically variable early switch to the Setback Save mode based on the outside temperature.
5. **Season:** A summer/winter menu selection shall be provided for summer shutdown. In the summer mode the control panel will not activate the steam source.
6. **Set Point:** The control shall provide an integral sensor set point adjustment for steam heating or process applications.
7. **Reaction Time and Minimum Runtime:** The control shall have the capability of adjusting the rate at which stages are added or subtracted using the Reaction Time and Minimum Runtime settings.
8. **Last Stage Hold:** The control shall have a last stage hold feature that shall keep the last boiler's lowest stage on for an additional, field adjustable, PSI above the set point before de-energizing it to reduce short cycling of the lead boiler.
9. **Purge Time:** The control shall have an adjustable purge delay. This setting shall determine the delay time required for a boiler to start to produce output
10. **Rotation:** The control shall be capable of rotating the boilers either based on an adjustable time period (between 1 hour and 999 hours), First-On/First-Off, or manually.

11. **Parallel or Normal Sequencing:** The control shall have an option for parallel sequencing where the control shall start the lower firing stages on all boilers before energizing the higher firing stages. Also, it shall have a normal sequencing mode where it shall bring on the lowest stage of a unit followed by the next higher stage on the same unit. Then when all stages on that unit are energized, it shall do the same to the next unit inline.
12. **Memory:** The control shall store all configuration and settings on EE-Prom. In case of power failure the control should be able to retrieve all of its latest settings.
13. **Display:** The control shall have a four line by twenty-character alphanumeric display capable of displaying both numbers and characters. The display shall be visible with no ambient light. All control operation information shall be available for display. During times of inactivity, or 5 minutes after the last user entry, the display shall enter default mode. In this mode the control shall display the outdoor temperature, system pressure, and each stage status.
14. **Setback Schedule or Remote Setback:** The control shall have a setback setting were it will reduce the pressure of the system either based on the programmed schedule or using an external setback signal.

E. Inputs:

1. **Outdoor Temperature:** This shall be the value read from the outdoor sensor placed on the north side of the building at least 10 Ft. above the ground.
2. **System Pressure:** This shall be the value read from the system sensor placed on the main header to measure the steam pressure.
3. **External Shutdown:** The control shall be capable of accepting a dry-contact shutdown input. This shall prevent any stage from being activated when the contact is closed.
4. **Prove Input:** The control shall be capable of accepting a dry-contact system prove input to check on system components before energizing any boiler stage. This shall prevent any stage from being activated until the contact is closed.
5. **Optional Sensors:** The control shall have the capability of connecting to a maximum of 64 compatible sensors. The sensors shall be of the temperature, pressure, oil tank level, water count meter, and switch closure. The control shall then be capable of logging, alarming, and maintaining a history of these sensor changes either on the control or a remote data server.
6. **Wireless Sensors:** The control manufacturer shall be capable of offering wireless sensor systems that can communicate to the selected control. The control shall then be capable of logging, alarming, and maintaining a history of these sensor changes either on the control or a remote data server.

F. Outputs:

1. Eight Stage relay outputs
2. System relay output

1.5 Communication Options (Select one)

- A. **Internet Communication:** The control shall be capable of communicating to the Internet using a high-speed Internet connection to communicate to the manufacturer or manufacturer representative web servers to send or receive its information.
 1. **Remote users** of the control shall have the capability of changing control parameters remotely using a web browser when provided with security log in information to the manufacturer's web site. In case of Internet communication malfunction, the control shall be capable of operating independently.
 2. **Security:** The control shall offer two levels of security, a web security and a control security. The web security shall have a minimum of two levels, a READ ONLY user and a FULL RIGHTS user. Multiple users shall be capable of accessing the control through the web system at the same time. During that access period, only a single user shall be capable of changing the control settings. The control security shall have a password security that allows only authorized users to make control changes.
 3. **Control and Sensor Data Logging/History:** The control shall be capable of sending all of its data as well its sensor data to a remote server for storage. The data shall be accessible through the

- Internet using a web browser.
4. **Alarms:** The control shall have alarm setting and delivery capabilities. The control and Internet system shall be capable of sending multiple alarm deliveries for each occurrence to cell phones as a text message or to multiple email addresses.
- B. **BACnet IP Communication:** The control shall be BACnet IP capable. It shall provide the user with BACnet IP communication Interface to an Energy Management System (EMS) or Building Management System (BMS) on the same BACnet network. The control shall be designed to be BACnet Application Specific Controller (B-ASC). The control shall manage the boilers through direct wiring to the equipment and not through the BACnet network.
 - C. **BACnet MSTP Communication:** The control shall be BACnet IP capable. However, will communicate to the BACnet network through an BACnet IP to BACnet MSTP router that is supplied by the control manufacturer at additional cost. It shall provide the user with BACnet MSTP communication Interface to an Energy Management System (EMS) or Building Management System (BMS) on the same BACnet network. The control shall be designed to be BACnet Application Specific Controller (B-ASC). The control shall manage the boilers through direct wiring to the equipment and not through the BACnet network.
 - D. **LonWorks, MODbus, Johnson Metasys, Johnson N2, Honeywell, Tridium, and other protocol communications:** The control shall be BACnet IP capable. However, will communicate to the other proprietary protocols through a BACnet IP to the specified proprietary protocol through a gateway that is supplied by the control manufacturer at additional cost. It shall provide the user with proprietary protocol communication Interface to an Energy Management System (EMS) or Building Management System (BMS). The control shall be designed to be BACnet Application Specific Controller (B-ASC). The control shall manage the boilers through direct wiring to the equipment and not through the BACnet network.

1.6 Regulatory Approvals

A. Underwriters Laboratories, Inc. (UL):

1. The control shall be tested per standard 916 "Energy Management Equipment".

B. The City of New York, Department of Environmental Protection (DEP).

1. The control shall be approved for installation in New York City by DEP under "Engineering Criteria for Fuel Oil Burning Equipment".

1.7 Included Items

- A. **Outdoor Temperature Sensor** shall be of the Thermistor type capable of measuring between -30°F to 250°F. It shall have a weather shield.
- A. **System Pressure Sensor** shall be a pressure transducer used to measure the pressure of the steam system at the main header. It shall be rated for 0-30PSI, 0-100 PSI, 0-200PSI, or 0-300PSI.

1.8 Security

A. Control Security:

1. The control shall have the option of using a security password that prohibits unauthorized users from changing settings.
2. Internet Capable controls: The web security shall have a minimum of two levels, a READ ONLY user and a FULL RIGHTS user. Multiple users shall be capable of accessing the control through the web system at the same time. During that access period, only a single user shall be capable of changing the control settings.